

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/552,133 Confirmation No. 7194  
Applicant: : Lars-Goran Wistrand  
Filed : October 6, 2005  
TC/A.U. : 1618  
Examiner: : Melissa Jean Perreira

Docket No. : PN0335  
Customer No. : 36335

Commissioner for Patents  
P.O. Box 1450  
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**AMENDMENT**

Madam:

In response to the Office Action of February 16, 2010, please amend the above-identified application as follows:

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks/Arguments** begin on page 6 of this paper.

**Amendments to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. – 12. (Cancelled)
13. (Currently amended) Process of dynamic nuclear polarisation (DNP) of a mixture comprising a sample and a radical, the sample comprising NMR active nuclei,  
wherein the DNP process includes placing the mixture in a DNP magnet and hyperpolarising the sample by microwave irradiation, and  
wherein the radical is generated in situ by photolysis of a radical precursor, the radical precursor being a photolabile organic compound and wherein the radical decomposes to a non-radical species at temperatures from about 5 K to about 273 K.
14. (Currently amended) Process according to claim 13 wherein the generation of the radical is carried out outside ~~a~~ the DNP magnet and the mixture is transferred into the DNP magnet after the radical generation.
15. (Previously presented) Process according to claim 13 wherein the radical is generated by photolysis of a mixture frozen in liquid nitrogen, the mixture comprising the sample and a radical precursor being a photolabile organic compound or an organic compound comprising a photolabile group.
16. (Previously presented) Process according to claim 15 wherein the radical is generated by freezing a mixture comprising the sample and a solvent in liquid nitrogen and irradiating the frozen mixture with high-energy radiation.
17. (Previously presented) Process according to claim 13 wherein the mixture further comprises a solvent.

18. (Previously presented) Process according to claim 13 wherein the mixture further comprises a glass forming compound.
19. (Previously presented) Process according to claim 13 wherein the radical precursor is a photolabile organic compound selected from the group consisting of  $R^1-X$ ,  $R^1-S-R^2$ ,  $R^1-Se-R^2$ ,  $R^1-N=N-R^2$ ,  $R^1-O-O-R^2$ ,  $R^1-ONO$ ,  $R^1-OX$  and  $R^1CO-O-O-COR^2$ , wherein  $R^1$  and  $R^2$  are identical or different straight chain or branched alkyl, aryl or aralkyl groups, and  $X$  is Cl, Br or I, or the radical precursor is an organic compound comprising a photolabile group, the photolabile group being selected from the group consisting of  $-R^1-X$ ,  $-R^1-S-R^2$ ,  $-R^1-S-R^2-$ ,  $-R^1-Se-R^2$ ,  $-R^1-Se-R^2-$ ,  $-R^1-N=N-R^2$ ,  $-R^1-N=N-R^2-$ ,  $-R^1-O-O-R^2$ ,  $-R^1-O-O-R^2-$ ,  $-R^1-ONO$ ,  $-R^1-OX$ ,  $-R^1CO-O-O-R^2$ ,  $-R^1CO-O-O-COR^2$  and  $-R^1CO-O-O-COR^2-$ , wherein  $R^1$  and  $R^2$  are identical or different straight chain or branched alkyl, aryl or aralkyl groups, and  $X$  is Cl, Br or I.
20. (Previously presented) Process according to claim 19 wherein  $R^1$  and  $R^2$  are identical.
21. (Previously presented) Process according to claim 19 wherein the radical precursor is selected from the group consisting of azobisisobutyronitrile, tert-butyl nitrite, tert-butyl hypochlorite, dibenzoylperoxide and di-tert-butylperoxide.
22. (Previously presented) Process according to claim 15 wherein the photolysis is carried out at wavelengths in the range of about 200 to 300 nm.
23. (Cancelled)
24. (Cancelled)
25. (Cancelled)

**REMARKS/ARGUMENTS**

Claims 13-25 are pending in the instant application. Claims 13-25 stand rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps. Claim 24 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Further, claims 13, 15-18 and 23-25 stand rejected under 35 U.S.C. 102(b) as being anticipated by Gregoli et.al. Claims 13, 17 and 19-21 stand rejected under 35 U.S.C. 102(b) as being anticipated by Savitsky et al. Claims 13 and 17 stand rejected under 35 U.S.C. 102(b) as being anticipated by Stanislav V. Rykov et al. Claims 13, 17 and 18 stand rejected under 35 U.S.C. 102(b) as being anticipated by Bajaj et al. Further, Claims 13-18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Bajaj et. al. in view of Wikipedia glycerol data. Claims 13-18 and 22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima et al. in view of Wikipedia gamma ray data p1-10 and in further view of combined references of Bajaj et al. and the Wikipedia glycerol data.

Applicants have amended the claims. Applicants respectfully submit that none of the amendments constitute new matter in contravention of 35 U.S.C. §132. Reconsideration is respectfully requested.

Claim 1 has been amended to include the text "wherein the DNP process includes placing the mixture in a DNP magnet and hyperpolarising the sample by microwave irradiation, and". Basis for this is found on page 1, second paragraph and Example 1, page 11, of the PCT text (WO2004/092759).

Claim 2 has been amended to refer to “the” DNP magnet, in view of amended claim 1.

Claims 23-25 directed to a process wherein the radical precursor is a solvent have been cancelled.

### **Claim Rejection – 35 USC 112**

Claims 13-25 stand rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps. Claim 13 has been amended to include the essential steps of the dynamic nuclear polarization process and Applicants respectfully submits that the objection has been obviated by the amendment.

Claim 24 has been cancelled and the objection has been obviated.

### **Claim Rejections – 35 USC 102**

Claims 13, 15-18 and 35-25 stand rejected under 35 U.S.C. 102(b) as being anticipated by Gregoli et.al. Gregoli is directed to methods for identification of radical species produced in DNA by ionizing radiations which is not directed to a process of DNP. Applicants respectfully submit that the objection has been obviated by the amendments to claim 13.

Claims 13, 17 and 19-21 stand rejected under 35 U.S.C. 102(b) as being anticipated by Savitsky et al. Savitsky is directed to photolysis of 2,2'-azobisisobutyronitrile (AIBN) and the generation of 2-cyano-2-propyl radicals. Quantitative measurements of spin polarizations after photolysis of AIBN is reported. Savitsky is clearly not directed to a process of DNP. Applicants respectfully submit that the objection has been obviated by the amendments to claim 13.

Claims 13 and 17 stand rejected under 35 U.S.C. 102(b) as being anticipated by Stanislav V. Rykov et al. Rykov is directed to photo oxidation and photolysis of compounds like carboxylic acids, and discloses that such photolysis can generate polarized compounds. However, Rykov is not directed to a process of DNP and does not disclose each and every step of amended claim 13. Applicants hence respectfully submit that the objection has been obviated by the amendments to claim 13.

Claims 13, 17 and 18 stand rejected under 35 U.S.C. 102(b) as being anticipated by Bajaj et al. Bajaj et. al. discloses enhancements of nuclear spin polarization by DNP. In all experiments Bajaj et al. uses the nitroxide radical 4-amino-TEMPO as DNP agent. TEMPO is a stable free radical which is commercially available in its free radical form. Nothing by Bajaj indicates that TEMPO is generated *in situ*. In contrary to the radicals of the present invention, 4-amino-TEMPO does not decompose in the temperature range of 5 to 273 K, but is stable as a free radical. Bajaj et. al. e.g. reports (page 87, first column) that signal enhancement can be realized at temperatures of 10-20 K, or conducted near 100 K. Hence, the radical is stable at such temperatures. This means that 4-amino-TEMPO is stable at such temperatures whereas the radicals used in the claimed process of the present invention, which are generated in situ, are decomposed to a non-radical species at a temperature from about 5 K. Hence, as the DNP process described in amended claim 13 and the dependent claims contain the features that the radicals used are generated *in situ* by photolysis and decompose to non-radical species at temperatures from 5 to 273 K these are novel over Bajaj et. al.

Reconsideration is respectfully requested.

### **Claim Rejections – 35 USC 103**

Claims 13-18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Bajaj et. al. in view of Wikipedia glycerol data. Bajaj et. al. fails to teach or suggest a DNP process wherein the radical used as a DNP agent is generated in situ by photolysis, and that such radical decomposes to non-radical species at temperatures about 5 to 273 K. The Wikipedia

glycerol data discloses that a 60 % glycerol solution freezes at 33.6 °C. There is nothing in the Wikipedia glycerol data which indicates a DNP process wherein radicals are generated in situ by photolyses and decompose at temperatures from 5 to 273 K. Hence, the claims are distinguished over the prior art because the prior art neither anticipates nor renders obvious the DNP process as set forth in the instant application.

Claims 13-18 and 22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima et al. in view of Wikipedia gamma ray data p1-10 and in further view of combined references of Bajaj et al. and the Wikipedia glycerol data. Kojimi et al. discloses a novel water-soluble photoinitiator; MBS, and the preparation and characterization of this. Kojima fails to teach or suggest a DNP process wherein the radical used as a DNP agent is generated in situ by photolysis, and that such radical decomposes to non-radical species at temperatures about 5 to 273 K. Hence, the claims are distinguished over the prior art because the prior art neither anticipates nor renders obvious the DNP process as set forth in the instant application.

Reconsideration is respectfully requested.

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Amdt. Dated May 14, 2010  
Reply to Office Action of February 16, 2010

**CONCLUSION**

In view of the amendments and remarks herein, Applicants believe that each ground for rejection made in the present application has been successfully overcome, and that all the pending claims, 13-22, are in condition for allowance.

The Examiner is invited to telephone the undersigned in order to resolve any issues that might arise and to promote the efficient examination of the current application.

Respectfully submitted,

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